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Missouri State Auditor

April 2005

TRANSPORTATION

Planning and Project Prioritization



MoDOT Historically Put More Money Into Road Expansion Over Road Repair, Which Has Kept Road Conditions Ranked Low Nationally

This audit reviewed how MoDOT decides which roads to build when, how it funds the planned projects, and how it uses performance measurement tools in these decisions. During the audit, MoDOT began designing new performance measures and released the new performance measurement system in January 2005. This audit evaluated the performance measurement system in place prior to 2005; auditors will review the new system at a later date.

Spending on preserving roads was below national average

Missouri ranked 37th nationally in how much it spent to preserve and maintain its roads, spending 53 percent less than the national average, according to a 2004 national study. In addition, MoDOT data showed road conditions did not improve between 1996 and 2003, and have remained below national averages since 1998. (See page 5)

Though preserving roads was priority, money did not follow

MoDOT has historically spent more money expanding roads, than repairing or preserving them. In 2001 planning documents, MoDOT called for a shift in resources to make road preservation "top priority." But the dollars did not always follow. For example, in June 2004, when MoDOT received an extra \$137 million in federal road dollars, only 22 percent went to preservation. Prior to the passage of Amendment 3, funding for 2006-2009 projects includes 56 percent spent on preservation, which MoDOT projections showed would not have been enough to achieve road condition goals. With the passage of Amendment 3, an additional \$360 million will be spent on preservation, however, no assessment has been made of the impact these funds will have on the highway system as a whole, or the highway system's long-range needs. (See page 8)

MoDOT performance data not fully used in funding decisions

Auditors found information given commissioners to guide their road funding decisions contained little information regarding measures of past performance. For example, commissioners received projections of road conditions, but did not see data showing how road conditions had failed to improve under past funding levels. Performance reports also did not contain updated data. For example, a July 2004 road condition report used 2001 data, when 2002 and 2003 data was available. (See page 14)

Expansion projects are not assessed for cost-effectiveness

MoDOT has not adequately assessed the cost-effectiveness of potential expansion projects as recommended by federal highway authorities. In addition, rural district expansion projects have not been evaluated consistently or compared to other rural district expansion projects on a statewide basis. (See page 18)



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Honorable Matt Blunt, Governor
and
Missouri Highways and Transportation Commission
and
Pete K. Rahn, Director
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The Missouri Department of Transportation (MoDOT) is responsible for administering the 7th largest state-maintained highway system in the nation, with approximately 32,000 miles of road and annual expenditures of approximately \$1.8 billion. During the course of our work, MoDOT began working on a new performance measurement system to track and report progress made in 18 strategic performance areas. MoDOT implemented the new performance measurement system in January 2005, after we completed our work. We plan to evaluate the effectiveness of this new system in tracking improvements to Missouri's overall highway conditions at a later date.

Because of the public's concerns regarding the overall conditions of Missouri roadways, we focused our work on MoDOT's planning and project prioritization processes in place prior to January 2005, to determine whether (1) MoDOT's funding allocation has been consistent with its strategic priorities for system preservation and maintenance, (2) improvements are needed in MoDOT's planning processes, and (3) MoDOT's project prioritization processes contain any weaknesses.

We found MoDOT's funding for system preservation and maintenance has been insufficient to achieve its highest priority strategic goal of improving road conditions. With the additional revenue resulting from the passage of Amendment 3, MoDOT expects to achieve its road condition goals by implementing the Smooth Roads Initiative. However, transportation officials have not assessed the extent to which overall road condition goals will be achieved as a result of the Smooth Roads Initiative, or the funding required to achieve long-range road condition goals subsequent to the completion of the Smooth Roads Initiative. Improvements are also needed in MoDOT's planning processes because performance measurement data has not been adequately used to make informed management decisions and its planning systems have not been capable of performing complex system projections other states have done. While MoDOT has implemented an improved project prioritization process, weaknesses still exist. MoDOT's project prioritization processes have not adequately considered the cost-effectiveness of major expansion projects, rural district-level expansion projects have not been prioritized on a statewide basis, and cost-share projects have not been assessed for cost-effectiveness and have not been subjected to a prioritization process or compared to other projects on a statewide basis. In addition, MoDOT does not plan to reevaluate expansion projects already included on the 2006-2009 STIP using its improved project prioritization process.

We conducted our work in accordance with Government Auditing Standards issued by the Comptroller General of the United States. This report was prepared under the direction of Kirk Boyer, Director. Key contributors to this report included Robert Spence, Robert Showers, and Chris Vetter.

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Abbreviations

MoDOT	Missouri Department of Transportation
STIP	State Transportation Improvement Program
FHWA	U.S. Department of Transportation – Federal Highway Administration
GAO	U.S. Government Accountability Office

Introduction

The Missouri Department of Transportation (MoDOT) is responsible for administering the state's transportation programs, with oversight by the Missouri Highways and Transportation Commission (Commission). MoDOT has more than 6,000 employees in ten districts and its headquarters. With annual expenditures of approximately \$1.8 billion, MoDOT operates the 7th largest state maintained highway system in the nation with approximately 32,000 miles of road (approximately 69,000 lane-miles). MoDOT is also responsible for multimodal operations which include mass transit, airports, waterways, and rails.

MoDOT revenues have increased an average of five percent per year over the past decade (1995-2004) from \$1 billion to \$1.6 billion. The majority of this increase is due to a steady increase in motor fuel tax revenue and significant increases in federal funding within the last five years. MoDOT also received and spent an additional \$900 million in bond proceeds between 2001 and 2004. Based on Federal Highway Administration (FHWA) data, Missouri ranks 42nd in the nation in revenue per vehicle miles traveled. In November 2004, Missouri citizens approved a constitutional amendment which will result in additional revenue of approximately \$187 million per year for transportation. The additional revenue will be phased in over a 4-year timeframe and will be used to pay costs associated with the issuance of bonds. (See page 11 for additional information.)

MoDOT has established a planning process in accordance with federal guidance that includes a 20-year long-range plan, which sets the overall direction of the agency and includes long-range goals, and a short-term strategic plan in which performance measures and short-term goals have been established for the state highway system. MoDOT has tracked the status of road conditions and progress on improving road conditions and has reported on the status of performance measures in a document called the Dashboard.

Since joining the department in September 2004, MoDOT's new Director has overseen the development of a new performance measurement system. MoDOT published its new performance measures in January 2005.

Funding Allocation Process

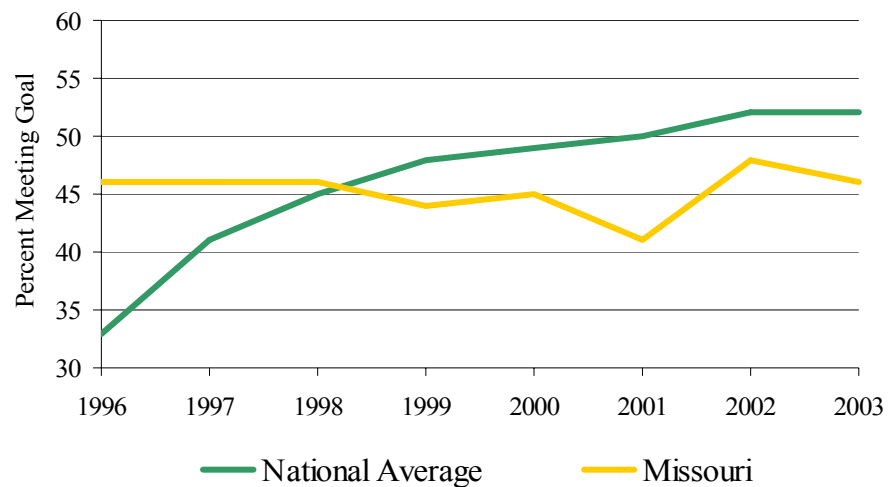
In 2003, the Commission approved a new fund allocation plan to allocate transportation funding among statewide projects and the ten districts. After construction funding is determined for the year (projected \$1.1 billion for 2005), the Commission develops an investment strategy by balancing competing system needs and local demands. (See Appendix I for current construction funding allocations.) The Commission establishes funding for system preservation and maintenance, system expansion, safety and other

projects. System expansion is considered any project which adds capacity to the existing system, such as new lanes or new overpasses, while system preservation and maintenance is considered to be any project which rehabilitates or reconstructs the existing roadway, such as resurfacing and preventative maintenance. When the funding allocation has been established, funds are distributed to the districts and statewide projects based on a distribution formula which considers various factors, such as the number of lane miles and percentage of population. Once district officials have been allocated funds, they then begin the process of selecting district-level projects. Specific projects are selected by the districts in conjunction with regional planning partners (local officials and stakeholders) and MoDOT headquarters personnel, approved by the commission, and are then added to the State Transportation Improvement Program (STIP). The STIP is MoDOT's five-year construction plan which details all projects planned for that timeframe.

System Preservation Spending and Road Conditions Have Been Below National Averages

Figure 1.1: Major Highways in "Good or Better" Condition

A 2004 national study¹ on highway conditions ranked Missouri 37th in the country in maintenance expenditures per state controlled mile, 53 percent less than the national average. As depicted in Figure 1.1, MoDOT's performance measurement data also shows the state's road system conditions have shown no improvement between 1996 and 2003, and has remained below national averages since 1998. According to FHWA data, the condition of Missouri roads ranks among the worst in the country.



Source: MoDOT Dashboard - Measurements of Performance, July 2004 and MoDOT planning personnel.

¹ The Looming Highway Conditions Crisis: Performance of State Highway Systems 1984-2002, Dr. David Hartgen, February 2004

Scope and Methodology

To determine what planning and prioritization procedures were in place at the district level we visited MoDOT district offices in Hannibal, Jefferson City, Macon, Sikeston and St. Louis. Since district personnel rely on regional planning councils for input into the prioritization process, we also contacted 7 of the 18 regional planning councils regarding their role in the prioritization process.

To analyze MoDOT's funding allocation and related planning procedures, we reviewed Commission minutes and obtained documentation used in the fund allocation process from MoDOT personnel. Historical and future construction data was obtained from MoDOT personnel and is based on STIP data available from 1994 through 2009.

We researched "best practices" on the internet and conducted subsequent follow-up interviews with the parties responsible for the research, when available to give us a better understanding of what other states have done regarding transportation planning and performance measurement. Based on research documents and related discussions, we obtained additional information from transportation departments in Colorado, Minnesota, Montana, Ohio, and Wisconsin, regarding processes used to prioritize projects, allocate funding and measure performance.

We also reviewed transportation literature to address the use of benefit-cost analysis in transportation planning. We reviewed literature from the FHWA and the U.S. Government Accountability Office (GAO), and Dr. David Hartgen, Professor of Transportation Studies at the University of North Carolina-Charlotte. Based on our review of the literature and interviews with a FHWA official and Dr. Hartgen, we determined Dr. Hartgen's use of cost-effectiveness in the selection of highway projects is consistent with FHWA guidance and GAO reports.

To understand the state level project prioritization process and factors that drove project decision-making, we performed numerous interviews with various MoDOT planning and operational staff. We also obtained available planning documentation related to project prioritization. To supplement our understanding of the factors used in project decision-making, we reviewed six statewide corridor projects from a listing of 51 system expansion projects, exceeding \$5 million, which were included in STIPs from 1999 to 2004, and to determine what data and other information had been considered in the project selection process, and the adequacy of the process. We obtained available documentation on the six projects and conducted interviews with MoDOT personnel for additional information and clarification of project justification.

Our audit relies significantly on project data contained in the STIP. In order to gain assurance as to the accuracy of that data, we performed data validation procedures. We traced a sample of projects from STIP data files to hardcopies of the STIP to ensure amounts and project details agreed. We also selected a sample from the hardcopy STIP and validated it against the STIP data file. We determined the project data were sufficiently reliable for the purposes of this report.

We requested comments on a draft of our report from the Director of Transportation, and those comments are reprinted in Appendix II. We performed our work between June and December 2004. We met with MoDOT's Director on March 8, 2005, to discuss a draft of this report and he provided us with a copy of MoDOT's new performance measurement report.

Funding for Preservation and Maintenance Has Not Been Consistent with Strategic Priorities

MoDOT established system preservation and maintenance as its highest priority in its 2001 planning documents. Although the funding allocated for the preservation and maintenance of Missouri's highway system has increased since establishing this priority, funding has been insufficient to achieve strategic road condition goals. This situation has occurred because the Commission has historically emphasized system expansion over system preservation and maintenance. With passage of Amendment 3, MoDOT plans to commit significant funding for system preservation and maintenance. Because MoDOT implemented a new performance measurement system, it does not plan to analyze the impact of Amendment 3 investment decisions on overall highway needs, or the financial commitment necessary to achieve long-range highway system improvements.

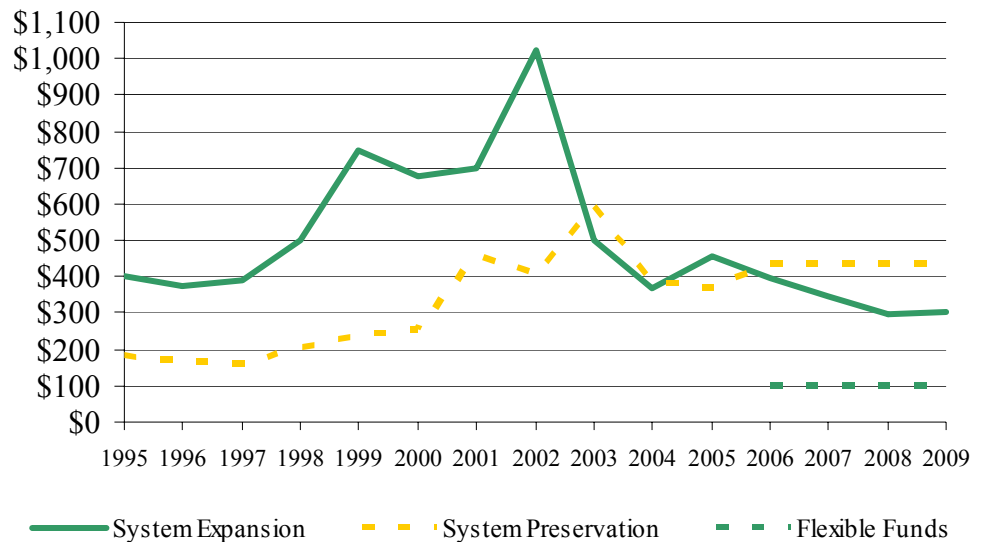
Funding Allocation Historically Favored System Expansion

MoDOT has historically funded system expansion at a significantly higher level than system preservation and maintenance with an average of 66 percent of available construction funds spent on system expansion from 1995 to 2004. Spending for expansion has been as low as \$372 million in 1996 and as high as \$1 billion in 2002 with additional bond financing. Funding for system preservation and maintenance expenditures have been as low as \$157 million in 1997 and as high as \$594 million in 2003. The funding allocation strategy, approved by the Commission in 2003, allocated more to system preservation and maintenance than to expansion for the first time for fiscal years 2006 through 2009, by allocating \$400 million per year for system preservation and maintenance compared to an average of \$336 million per year for system expansion.

Additional funding in 2004 spent on expansion projects

In June 2004, when an additional \$137 million in federal appropriations became available for construction, the Commission agreed to allocate only \$30 million (22 percent) towards system preservation and maintenance, \$97 million (71 percent) towards major projects and expansion, and \$10 million (7 percent) toward the economic development/cost-share program. Figure 2.1 depicts MoDOT's historic and projected funding for system expansion compared to funding for system preservation and maintenance.

Figure 2.1: Construction Expenditures¹ by Work Type (Dollars in millions)



¹ Does not include Amendment 3 funding. See page 11 for discussion on Amendment 3 funding.
Source: STIP summary data from MoDOT Planning Department.

According to MoDOT officials and MoDOT's current strategic plan, MoDOT's past and current emphasis on system expansion has been predicated on MoDOT's desire to fulfill the commitments of the 1992 15-year Road and Bridge Plan.

Allocated Funding Insufficient to Achieve Road Condition Goals

Based on significant input from the public, MoDOT's 2001 long-range plan emphasized system preservation and maintenance as its top priority, with system expansion as a secondary priority.² However, the department has not reflected that priority in its funding strategy until fiscal years 2006 through 2009, when approximately 56 percent³ of available construction funds were allocated for system preservation and maintenance. While this represents an increase in funding from the past decade, in which funding for system preservation and maintenance averaged 34 percent of construction funds, MoDOT documents show this level of funding would not have been sufficient to achieve MoDOT's short-term road condition goal of having 50 percent of national highway system and 85 to 90 percent of interstate miles in "good" condition within 10 years.

² In 2001, MoDOT's Director told the Commission \$645 million would be needed for system preservation and maintenance.

³ Assumes flexible funds allocated to the districts are split evenly between expansion and maintenance.

Commission reduced
recommended funding

In January 2003, MoDOT officials presented the Commission with three funding allocation options calling for an average of \$535 million per year for 10 years to be allocated toward system preservation and maintenance. MoDOT officials provided the Commission with documentation showing all three of the options would be sufficient to achieve strategic road condition goals. Based on input from local planning stakeholders, a MoDOT official subsequently recommended a fourth option which reduced funding to \$450 million per year for system preservation and maintenance and resulted in increased funding for system expansion projects. MoDOT documentation explained that preservation and maintenance funding had been reduced "to provide a better balance between the competing objectives of the transportation system." The official informed the Commission the recommended amount of \$450 million per year would not be sufficient to achieve road condition goals within 10 years, but would allow the department to "begin moving toward" those goals. During discussions regarding funding distribution, the Commission reduced the \$450 million to approximately \$400 million per year.

The Commission reallocated the \$50 million reduction from preservation and maintenance and another \$50 million from system expansion funds to establish \$100 million per year in "flexible funds" for districts to use at their discretion for system expansion or preservation and maintenance. According to the 2006-2009 STIP, approximately \$37 million was programmed for preservation and maintenance and about \$14 million had been programmed for expansion projects in 2006.

Updated estimate showed
\$575 million needed annually
to meet road condition goals

In September 2003, the Chief Engineer informed the Commission an annual investment of \$575 million for 10 years would be needed for system preservation and maintenance in order to achieve MoDOT's current short-term road condition goal of having 50 percent of the state's national highway system miles and arterials⁴ in "good" condition. No action was taken by the Commission based on this information.

In commenting on a draft of this report MoDOT officials indicated road condition goals would have been achieved eventually under the recommended funding level of \$450 million per year. However, the recommended level of funding would not have allowed for the accomplishment of road condition goals within a 10-year timeframe.

⁴ MoDOT data shows there are 4,236 national highway system miles and 4,828 arterial miles. Arterial miles represent major roads connecting to the national highway system.

System Preservation and Maintenance Spending to Increase With New Funding

Voter approval of Amendment 3 in November 2004 will allow MoDOT to issue approximately \$1.7 billion in bonds for use towards system preservation and system expansion projects.⁵ In January 2005 the Commission approved a plan to spend the first \$360 million in bond funds on preservation and maintenance by resurfacing approximately 2,200 major highway miles as part of what officials referred to as the Smooth Roads Initiative. According to MoDOT data, these 2,200 miles carry 60 percent of the state's traffic.

The Commission also approved the acceleration of approximately \$180 million in system preservation and maintenance projects and approximately \$251 million in expansion projects involving the same 2,200 miles, which had already been programmed in the 2005-2009 STIP. The accelerated projects will be funded initially using bond funds, but MoDOT officials anticipate having approximately \$1.3 billion in bonds available for projects after 2006. According to MoDOT officials, the Smooth Roads Initiative will allow the department to easily achieve, or exceed, MoDOT's short-term road condition goal which calls for 50 percent of the national highway system and arterials and 85 to 90 percent of interstate miles to be in "good" condition.

While MoDOT officials believe this initiative will achieve MoDOT goals, officials do not plan to make a detailed assessment estimating the extent to which short-term condition goals will be achieved or exceeded on the remainder of the system's 30,000 miles following the completion of the Smooth Road Initiative. In addition, officials do not plan to assess the financial commitment that will be required to achieve long-range road condition goals for the national highway and arterial systems, or the remainder of the highway system, after the Smooth Roads Initiative funds have been expended. Instead, MoDOT's Director told us the department is in the process of developing new performance measures. These measures will not include the previous percentage road condition goals. The Director plans to track incremental improvements on a year-to-year basis and publish results on a quarterly basis, which he believes will increase accountability.

⁵ Voters passed Amendment 3 in November 2004. With passage, MoDOT will receive an additional \$187 million in additional funds which it plans to use to finance the issuance of \$1.7 billion in bonds.

Conclusions

Based on input from the public, MoDOT established preservation and maintenance of the existing highway system as its highest priority in its 2001 long-range planning documents. While system preservation and maintenance funding has increased in recent years, the amount allocated by the Commission through 2009 would not have allowed MoDOT to achieve its short-term road condition goal of having 50 percent of the national highway system and remaining arterials in "good" or better condition within a 10-year timeframe. As late as September 2003, MoDOT informed the Commission an annual investment of \$575 million in system preservation funding would be necessary in order to achieve short-term road condition goals within a 10-year timeframe. However, the Commission has not taken action on this information. In fact, when \$137 million per year in additional federal funds became available in June 2004, the Commission voted to allocate 71 percent of those funds to system expansion and only 22 percent towards preservation and maintenance.

With an anticipated additional \$1.7 billion in bond funding, associated with the passage of Amendment 3, MoDOT plans to spend approximately \$540 million on system preservation and maintenance and \$251 million on expansion projects over the next three years as part of the Smooth Road Initiative. MoDOT officials believe this initiative will allow them to meet or exceed goals for 2,200 miles of Missouri's most heavily traveled roads. However, officials do not plan to make a detailed assessment of the extent good road conditions may be achieved, or exceeded, on the remaining 30,000 miles of Missouri's highway system as a result of this initiative. In addition, the department has not determined the investment needed to achieve good road conditions for the national highway and arterial system, or the remainder of Missouri's highway system, following this initiative. Because of the new performance measures rolled out in January 2005, MoDOT officials no longer plan to use goals specified in the strategic plan. Instead, officials told us they plan to track and report on incremental improvements in 18 strategic performance areas.

We believe assessing the impacts of investment decisions, such as the Smooth Roads Initiative, on the whole highway system is necessary to ensure MoDOT is moving in the right direction to best serve its customers. Without this assessment, it can be difficult to align investment decisions with road conditions improvement needs. In addition, until new department strategies and performance measures are clearly defined, assessing the impact of investment decisions is necessary to ensure all system preservation needs are met. Once the new performance measurement tool is fully implemented, we will evaluate its effectiveness.

Recommendation

We recommend the Commission:

- 2.1 Determine the appropriate investment needed to achieve good road conditions for the state's 32,000 mile road system, and align investment decisions with that strategy to ensure improvements in road conditions are accomplished timely.

Agency Comments

MoDOT's comments are included in Appendix II.

Improvements Are Needed in MoDOT's Planning Processes

MoDOT's planning process has not taken full advantage of the performance measurement process in place. Performance measurement data has not always been used to make management decisions, and data used for the purposes of measuring performance has not been updated timely. Improvements are also needed in MoDOT's transportation planning systems. When making overall investment strategy decisions, MoDOT has not been capable of performing complex trade-off analyses, and other analyses, which would allow officials to project the effect various investment strategies may have on the state's road systems and economy. As a result, MoDOT cannot be assured transportation funds have been expended in the most effective manner possible and its road improvement investment strategies will achieve overall system goals.

Use of Performance Measurement System Not Maximized

MoDOT has not fully utilized the performance measurement process as a management tool. While MoDOT has established performance measures, short-and-long-term performance goals, and has established a tool to measure progress toward stated goals, data collected to measure progress has not been updated in a timely manner and has not been used effectively to make management decisions.

Performance data not adequately used as a management tool

MoDOT has not adequately integrated performance measurement data into its decision-making process regarding the allocation of highway system investments. Our review of MoDOT documentation provided to the Commission to guide its decisions regarding the new fund allocation method disclosed it contained minimal information on performance measures or progress MoDOT had made in meeting its stated goals in previous periods. For example, our review of MoDOT data disclosed that although projections of road conditions had been provided to the Commission, no information had been provided regarding the lack of improvement in road conditions at past funding levels. Road condition performance data indicated, as of the end of 2003, road conditions have not improved from 1996 levels and actually decreased from 2002 to 2003 despite increased system preservation and maintenance spending over that time frame (see Figure 2.1 for funding levels). Performance data regarding safety measures and metropolitan congestion were also not included in the fund allocation discussion.

MoDOT's performance measurement report stated the primary use of performance measurement information is to assess the department's overall progress and to demonstrate accountability to its stakeholders, but did not specify its use in the decision-making process. Performance measurement

Performance data reported has been outdated

guidance⁶ states a performance measurement process should first be "integrated into the planning, management, and decision-making process of an agency." This includes evaluating measures of past performance to determine the effectiveness of strategies in place and making appropriate adjustments depending on the outcomes. It also states a performance measurement process which is integrated into the decision-making process will help ensure accountability, efficiency, effectiveness, improved communication, clarity and improvement over time.

MoDOT reported performance data collected to the Commission in a performance measurement report, dated July 2004. However, data presented in this report had not been updated in a timely manner. For example, the report contained road and bridge condition data through 2001, when 2002 and 2003 data had been available for use. In addition, metropolitan congestion data had only been updated through 2001 and accident data had only been updated through 2002.

MoDOT officials stated there is no urgency to update the data in the performance measurement report because they use data trends over time to measure progress and do not believe it is necessary to update it in a more timely fashion. However, according to a study published by the National Performance Review,⁷ "performance information should be disseminated quickly. Putting useful information into the hands of an organization's decision makers promptly and efficiently is critical."

Transportation Planning Systems Have Limited Capabilities

MoDOT has used its transportation management system to track all transportation related data and has used this data to provide limited projections of road conditions. However, our review of best practices in transportation planning disclosed some states have implemented transportation planning systems which allow those states to perform analyses MoDOT's system currently cannot perform. We found Montana, Colorado, and Ohio have implemented customized planning systems which have enabled them to perform complex trade-off analyses allowing decision makers to forecast the effects various investment strategies may have on their states' overall transportation systems. It also has allowed decision makers to determine various levels and mixes of performance objectives that can be accomplished with given funding and benefit-cost constraints.

⁶ Use of Performance Measures in Transportation Decision Making, Steve Pickerell and Lance Neumann, Cambridge Systematics, Inc., Conference Proceedings 26, Performance Measures to Improve Transportation Systems and Agency Operations, Transportation Research Board, National Academy Press, Washington DC, 2001.

⁷ Serving The American Public: Best Practices in Performance Measurement, National Performance Review, June 1997.

For example, these states could determine the most effective way to invest transportation funds in terms of road conditions, transportation goals, demographics and economic impact.

Other states have implemented the Highway Economic Requirements System for States, which is a version of the management system used by the FHWA. This model performs the same trade-off analyses the Montana and Colorado systems can perform, but may not be specifically customized to each specific state. According to the FHWA, this system "uses engineering standards to identify highway deficiencies, and then applies economic criteria to select the most cost-effective mix of improvements to system-wide implementation." It can also be used to "evaluate the implications of alternative programs and policies on the conditions, performance and user cost levels associated with highway systems."

MoDOT officials acknowledged MoDOT's current transportation management system's trade-off analyses have been limited to road system conditions. However, officials believe the current system is adequate and meets their needs.

Conclusions

While MoDOT has taken positive steps in its development and tracking of performance measures, performance data has not been adequately integrated into its decision-making process. To properly integrate performance measures into the decision-making process MoDOT and the Commission must monitor the progress toward performance measures and use that information when allocating resources. By tying progress towards performance goals to the fund allocation process, MoDOT and the Commission can create accountability for achieving performance goals. However, in order for performance data to be used effectively, MoDOT's performance data must be kept up-to-date.

MoDOT's current transportation planning systems have limited capabilities and cannot perform complex trade-off analyses which would provide MoDOT officials with important information regarding the most cost-beneficial investment of funds. We believe this type information, in combination with an integrated performance measurement system, would allow MoDOT officials and the Commission to make more effective investment strategy decisions.

Recommendations

We recommend the Commission:

- 3.1 Establish procedures requiring the use of performance measurement data included in MoDOT's performance management report as part of the decision-making process when determining investment strategies.
- 3.2 Establish procedures to ensure timely performance data is included in MoDOT's performance management report.
- 3.3 Determine the feasibility of upgrading the current transportation planning systems to allow for more complex investment trade-off analyses for use in making investment strategy decisions.

Agency Comments

MoDOT's comments are included in Appendix II.

Weaknesses Exist in MoDOT's Project Prioritization Processes

MoDOT has not adequately assessed the cost-effectiveness of statewide expansion projects. In addition, rural district-level expansion projects have not been prioritized on a statewide basis or objectively evaluated in a consistent manner. Cost-share projects also have not been adequately assessed for cost-effectiveness and have not been subject to the project prioritization process or compared to other projects on a statewide basis. MoDOT has made improvements in its project prioritization process that should ensure all projects are evaluated in a more objective manner. However, the new process does not ensure district-level expansion projects are evaluated in a consistent manner from district to district. Despite the improvements made in the project prioritization process, MoDOT officials do not intend to reevaluate projects already included on the current STIP. As a result of these weaknesses, MoDOT cannot be assured investments in current and future highway improvement projects selected for construction will provide the greatest benefit to the state's transportation system.

Cost-Effectiveness of Expansion Projects Not Adequately Considered

MoDOT indirectly considers the cost-effectiveness of projects selected for construction by using project prioritization processes that consider factors such as traffic volume, safety and congestion. However, MoDOT has not used a formal assessment of benefit-cost as recommended in transportation literature and government organizations. For example, according to GAO reports,⁸ GAO, the Office of Management and Budget, and the U.S. Department of Transportation have identified the use of a formal benefit-cost analysis as a useful tool for integrating the social, environmental, economic, and other effects of investment alternatives, and for helping decision-makers identify projects with the greatest net benefits.

FHWA guidance⁹ also recommends the use of a formal benefit-cost analysis which considers the life-cycle benefits and costs of a given project. The potential benefits for a project are directly related to the volume of traffic the road handles. The benefits considered include travel time and delay, vehicle operating costs, reduction in accidents and reduction in noise and emissions, while costs typically considered include agency costs, such as design, construction and land acquisition costs, as well as future maintenance costs. According to the FHWA, a formal benefit-cost analysis "considers the changes in benefits and costs that would be caused by a potential improvement to the status quo facility." FHWA guidance explains

⁸ Surface Transportation: Many Factors Affect Investment Decisions, GAO, June 2004 (GAO-04-744), and Highway and Transit Investments: Options for Improving Information on Projects' Benefits and Costs and Increasing Accountability for Results, GAO, January 2005 (GAO-05-172).

⁹ Economic Analysis Primer, United States Department of Transportation, FHWA, August 2003.

this analysis can be used to help determine 1) whether or not a project should be undertaken at all, 2) when a project should be undertaken, and 3) which competing projects should be funded given a limited budget.

According to the FHWA, an economic analysis, such as a benefit-cost analysis, "is a critical component of a comprehensive project or program evaluation methodology that considers all key quantitative and qualitative impacts of highway investments. It allows highway agencies to identify, quantify, and value the economic benefits and costs of highway projects and programs over a multiyear timeframe. With this information, highway agencies are better able to target scarce resources to their best uses in terms of maximizing benefits to the public and to account for their decisions." Without formal benefit-cost analyses, it is difficult to assess the true cost-effectiveness of metropolitan and rural expansion projects.

In its June 2004 report, GAO recognized challenges exist when using benefit-cost analyses. Difficulties exist in identifying the distribution of benefits and costs of alternative projects across affected locations, quantifying and assigning a dollar value to some effects, and ensuring the precision of estimates used in the analyses. Notwithstanding these challenges, GAO concluded benefit-cost analysis remains an important and useful tool in helping select transportation projects.

MoDOT officials stated their prioritization methodology is adequate since it indirectly considers cost-effectiveness. The officials also stated placing too much emphasis on cost-effectiveness is not a good idea because other transportation factors, such as connectivity and safety, often outweigh the cost-effectiveness of a particular project. As previously discussed, the FHWA recommends the use of a formal benefit-cost analysis, which includes transportation factors such as reductions in accidents and travel time.

Rural Expansion Projects Not Prioritized Against Other Rural Projects on a Statewide Basis

MoDOT's rural districts are responsible for prioritizing smaller scale system expansion projects, such as overpasses. Approximately \$72 million per year is allocated to the districts for non-metropolitan expansion projects. However, once prioritized at the district level, rural district expansion projects have not been compared against other rural district projects on a statewide basis. According to MoDOT planning officials, comparing projects across districts would negate the intent of MoDOT funding allocation. The officials told us they designed the fund allocation methodology to provide an equitable method of allocating funds between districts and to prioritize projects on a statewide basis may result in an inequitable distribution of expansion funds.

FHWA guidance recommends rural projects compete on a statewide basis when funds are apportioned between rural and metropolitan areas for the sake of equality, such as they are in Missouri. Transportation literature states that not comparing rural expansion projects on a statewide basis does not ensure funds allocated for that purpose are used in the most effective manner possible.

Based on our observations, MoDOT's current process allows one rural district to use expansion funds to construct an expansion project even though there may be several other rural districts across the state that have more worthy projects that remain unfunded. For example, an overpass and outer road at Route C and Highway 61 at Moscow Mills in Lincoln County, a project with significant safety concerns as a result of significant population growth in the area, has yet to be constructed¹⁰ because insufficient district-level expansion funds have been available to the Hannibal district. At the same time, other rural district expansion projects have been completed in other districts without a benefit-cost comparison of the projects.

Districts' prior project prioritization processes not consistent

Discussions with district planning personnel at five districts¹¹ disclosed MoDOT has not used a uniform project prioritization methodology at the district level. For example, while three districts had implemented a process in which each project had been given a score allowing district planning personnel to cross-compare projects, others had not. However, for two of the districts that had implemented scoring systems, the scores were based primarily on subjective input from local stakeholders and planning officials and not objective transportation and demographic data. This was not the case at the St. Louis district, where extensive transportation data had been used in the prioritization process. Transportation research recommends the use of a consistent evaluation methodology to prioritize projects.

MoDOT planning officials have recognized this weakness and are in the process of implementing a consistent evaluation methodology which is designed to allow the districts to cross-compare potential projects within each district using less subjective data.

¹⁰ Project is included in the current STIP and is planned for construction in fiscal year 2006.

¹¹ We visited MoDOT district offices in St. Louis, Hannibal, Jefferson City, Sikeston and Macon.

New prioritization process makes statewide comparisons of rural projects difficult

MoDOT's new prioritization methodology introduces increased objectivity and improved local input into the prioritization process, and allows districts significant flexibility to adjust prioritization factors. However, the flexibility of the new process will make statewide comparisons of rural projects difficult. For example, one district may believe congestion is a priority and give it a weight of 30 percent, while another district may feel congestion should only be given a weight of 5 percent. As a result, a project would be given different scores depending on which district scored it.

MoDOT officials stated this flexibility is intentional and recognizes the difference in urban and rural districts. It is an important part of the new framework because it allows each district to customize its prioritization process. MoDOT's approach may be reasonable in recognizing differences between urban and rural districts. However, transportation literature supports the statewide prioritization of rural district-level expansion projects and we believe consistency among urban districts and among rural districts would allow comparisons of projects at the rural district level.

Cost-Share Projects Not Evaluated for Cost-Effectiveness or Compared Against Other Expansion Projects

The Commission's current funding allocation includes \$30 million a year for cost-share projects. The cost-share allocation has increased from \$15 million in 2002 to \$20 million in 2003 and 2004. Cost-share funds are used for projects in which local entities are willing to assist in the project's funding and also for projects which involve economic development considerations. Cost-share program policy states that a local entity must contribute up to 50 percent of the project costs before MoDOT will pay for the remainder. MoDOT has used cost-share funds to construct projects of various scale. For example, cost-share funds have been invested in large-scale major projects such as the four-lane expansion of Highway 63 from Macon to Kirksville and the renovation of the intersection of Interstate 470 and Highway 50, mid-scale major projects such as the re-routing of Highway 72 around Fredericktown, and smaller scale projects such as turn lanes and on ramps.

Cost-share projects have not been subject to benefit-cost analysis, and cost-share program policy has not required projects meet specific criteria to ensure cost-effectiveness of projects under consideration prior to construction. Program policy only contained general criteria. For example, the project must be on the state system and provide a public benefit. In addition, since cost-share funds have been set aside specifically for cost-share projects, they have not been subject to the normal prioritization process and the full amount of available funds have been awarded to cost-share projects without any cross-comparison of other statewide expansion projects.

Our review of other states' prioritization efforts determined that Ohio's transportation department currently includes cost-share projects in the normal expansion project prioritization process. In Ohio, cost-share projects are evaluated using a separate evaluation tool which includes consideration of the cost-effectiveness of a given project, but the resulting scores are combined with the statewide expansion projects being considered for construction and the top projects across the state are selected. Ohio's prioritization of cost-share projects is consistent with transportation literature since it helps ensure the most cost-effective projects are completed first.

MoDOT officials conceded some of the projects constructed with cost-share funds would not have been constructed through the normal prioritization process, or had been significantly accelerated by the use of local money. The officials also stated the cost-share program is intended to foster economic development while at the same time leveraging local funds into the transportation system.

Existing Expansion Projects Will Not Be Reevaluated

MoDOT officials told us expansion projects already included in the 2005-2009 STIP will not be reevaluated using the new project prioritization process. Based on our review of MoDOT projects, over \$900 million is expected to be spent on expansion projects during the last three years of the most recent STIP, with the majority of these projects not started until after 2005.

As previously discussed, the new prioritization methodology introduces increased objectivity and improved local input into the prioritization process. However, MoDOT officials do not plan to reevaluate projects included in the current STIP because those projects represented commitments already made to the citizens of the state.

Conclusions

MoDOT has not adequately incorporated benefit-cost analyses into its statewide expansion project selection process. Without a formal benefit-cost analysis, it is difficult to assess the true cost-effectiveness of urban and rural projects. In addition, rural district expansion projects have not been required to compete with other rural district projects on a statewide basis. MoDOT officials have taken action to correct inconsistencies in MoDOT's prior prioritization process. However, flexibility allowed in MoDOT's new process would make statewide comparison of rural projects difficult, if not impossible. As a result, the department has no assurance the highest priority and most cost-effective statewide and district expansion projects have been selected for construction. Because of the high cost of expansion projects,

and limited state funding, we believe it is important MoDOT use a project prioritization process that selects expansion projects which will provide the greatest benefit to Missouri's citizens and transportation system.

Without specific criteria ensuring the cost-effectiveness of cost-share projects and without prioritizing cost-share projects against other expansion projects, MoDOT cannot be assured cost-share projects selected for construction represent the most effective investment of the \$30 million in cost-share program funds.

The current STIP includes approximately \$900 million in expansion projects which have yet to be started. However, MoDOT officials have no plans to reevaluate those projects using the improved project prioritization process. Using the improved process would be beneficial in ensuring projects planned under the old process are still a high priority and are important to local planning partners and the public.

Recommendations

We recommend the Commission:

- 4.1 Implement the use of a formal benefit-cost analysis in conjunction with the new prioritization process to more effectively evaluate the cost-effectiveness of proposed expansion projects, including cost-share projects.
- 4.2 Require the rural districts to prioritize expansion projects on a statewide basis and in a consistent manner.
- 4.3 Require cost-share projects to be subjected to the prioritization process and compared to other projects on a statewide basis.
- 4.4 Using the improved project prioritization process, reevaluate STIP expansion projects that have yet to be started to ensure they are still a high priority and are important to local planning partners and the public.

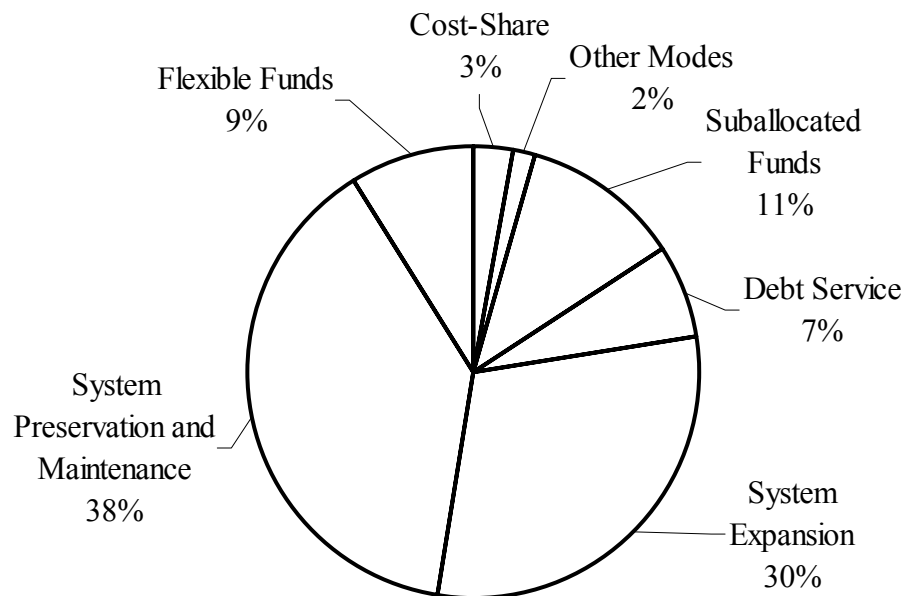
Agency Comments

MoDOT's comments are included in Appendix II.

Funding Distribution

This appendix shows MoDOT's construction funds distribution, and defines each funding category. Figure I.1 depicts the projected distribution of \$1.1 billion in transportation construction funds starting in calendar year 2005. The Commission approved the current funding allocation in January 2003 and includes an increase in federal funding which became available in June 2004.

Figure I.1: Distribution of Construction Funds



Suballocated Funds – Represents a total of \$128 million in federal funds which have been designated to specific projects by the United States Congress.

Other Modes – A total of \$18 million per year is designated for projects involving other modes of transportation including transit, aviation, waterways and railways.

Cost-Share – Approximately \$30 million per year in cost share funds are set aside for projects in which local revenues can be used to fund up to 50 percent of local projects. Emphasis is also given to projects which include an economic development aspect to them.

Debt Service – Approximately \$75 million per year will be necessary to repay bond commitments. This amount is based on the amount already bonded over 20-years, additional borrowing would necessitate additional debt service payments.

Appendix I Funding Distribution

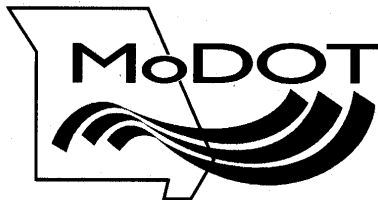
System Preservation and Maintenance – Approximately \$430 million per year will be spent on taking care of the existing system, which includes \$125 million for preservation of the interstate system, \$25 million for safety projects, and \$280 million for preservation and maintenance of the remaining system.

Flexible Funds – Approximately \$100 million will be distributed to the districts to be spent at their discretion between system preservation and maintenance, system expansion, and safety projects. This funding will not be distributed until state fiscal year 2006.

System Expansion – Approximately \$334 million will be distributed between major metropolitan areas, the districts and MoDOT for projects which expand the existing system's capacity.

Agency Comments

*Missouri
Department
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March 30, 2005

Mr. Kirk Boyer
Director of Performance Audits
Harry S. Truman Building, Room 880
Jefferson City, MO 65101

Dear Mr. Boyer:

Thank you for the opportunity to respond to the draft audit report on Transportation Planning and Project Prioritization. MoDOT prides itself on being a learning organization that embraces change and continuous improvement. Over the past few years, we have worked with our planning partners to improve transportation planning and decision-making processes and to identify a more balanced approach for distributing Missouri's transportation dollars as supported by the Missouri Highways and Transportation Commission. The bottom line is that Missouri has far more transportation needs than available funding, and therefore, tough decisions have to be made. We work continuously with our planning partners to make these decisions and to stretch Missouri's transportation dollars as far as possible.

MoDOT has a new performance measurement tool called the TRACKER. The TRACKER helps us assess our progress in meeting our customers' expectations. Over the years, through public outreach and planning efforts, we have learned what the public expects – what tangible results they're looking for as MoDOT delivers transportation products and services Missourians count on. The TRACKER includes 18 tangible results such as smooth and unrestricted roads and bridges, a safe transportation system and the best value for every dollar spent. There are specific performance measures associated with each tangible result. TRACKER is a work in progress and will change over time, but the measures it includes are the vital signs of our organization and gauge our performance in delivering what Missourians expect.

We are also updating our long-range transportation plan, the Missouri Advance Planning (MAP) initiative. The MAP will link the TRACKER performance measures, future funding projections and various levels of transportation investments through a tool used for making high-level investment comparisons. This tool will help with future transportation decision-making by illustrating the system performance trade-offs associated with different investment decisions. The MAP effort will also involve Missourians in refining their idea of the transportation system they desire, what they are willing to pay for it and the trade-offs they would support.

MoDOT is changing, and we don't expect to stop any time soon. It is crucial that we continue to improve and that we keep working with our planning partners and customers. We agree with your assessment that too little has been spent on maintenance over the past decade. We are addressing this need in two ways: (1) We have increased preservation investments to \$430 million in 2006, up from \$157 million in 1997; and (2) We are investing \$360 million from Amendment 3 to achieve good condition on 2,200 miles of roads that carry 60 percent of Missouri's traffic and are within 10 miles of 86 percent of Missouri's population. We have promised to deliver many of the projects already in the STIP sooner when it is

Our mission is to provide a world-class transportation experience that delights our customers and promotes a prosperous Missouri.

Appendix II

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possible. We are also working with our planning partners to deliver over \$1 billion in transportation system improvements over the next five years thanks to Amendment 3.

The audit report states that a cost-effectiveness evaluation is beneficial when making programming decisions about which projects should be funded. MoDOT's Planning Framework includes prioritization processes that indicate how well a transportation project solves a technical transportation problem. We use the results of this technical analysis, along with the cost of each project and the qualitative factors associated with each project, in the discussions with our planning partners to determine which projects to fund. We will continue to build on and improve this prioritization process, and develop a useful method to better gauge the cost-effectiveness of investment decisions. We appreciate your research in this area. We will continue to look into what other states are doing and what can be applied in Missouri.

We, along with our planning partners, believe there must be some flexibility at the district level to address immediate transportation needs on a small scale. This is why we allocate approximately \$72 million annually to our 10 MoDOT districts to use for regional projects. This is the most flexible of all our funding categories and can be used on almost any type of transportation project. This funding is primarily used for small safety and operational improvements. These small regional projects could not easily compete on a statewide level with major corridor projects, but we believe it's important that there is a mechanism to address them.

For example, coordinating regional traffic signals throughout the Kansas City metro area for smoother traffic flow will help reduce congestion, contribute to better air quality and make for safer traveling. Installing traffic signals on Route 50 at the California High School will ensure these young people a safer educational experience. Improving the intersection at Loop 29 and Country Club Village in St. Joseph by adding turn lanes and signals will improve safety and accommodate a new road serving a commercial development, thus supporting the state's economic stability and growth. Each district worked with their regional planning partners to determine evaluation factors for this funding category based on their unique geographic priorities.

For statewide rural expansion projects, MoDOT is already using a process similar to the one recommended in the auditor's report. All statewide rural major projects are consistently evaluated at the statewide level – with involvement from all MoDOT districts and planning partners. We begin by evaluating the technical merit of the project based on traffic volumes, safety data, pavement and bridge condition, and other system data, then work with our planning partners and local officials to consider other qualitative information needed to make a sound investment decision.

We are currently in the process of selecting new statewide major projects that could be funded with Amendment 3 dollars. We started in November, working with planning partners to determine what high-priority projects should be considered. We have worked through our process to gather information about all the projects and begin narrowing the list down to one that can be funded with available resources. We will be hosting a meeting of the Major Project Prioritization Task Force in just two weeks to finalize a recommendation. The meeting is set for April 13, 2005, 8:00 AM – 5:00 PM at the Capitol Plaza Hotel.

Finally, we cannot reevaluate and potentially remove the publicly supported, high-priority expansion projects in the current Statewide Transportation Improvement Program (STIP). Most of these rural expansion projects are part of larger corridor projects not yet completed. The projects' benefits will not be fully realized until the corridors are built to a logical stopping point. These projects are our commitment to Missourians, and we cannot compromise our credibility by breaking these commitments.

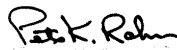
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While we have improved the process we use to select projects, we involved planning partners and used quantitative data to select the projects in the current STIP, and we stand behind them.

MoDOT has been commended for its innovations in planning and public engagement over the past year. We have been honored with several national awards in recognition of our leadership in transportation planning, and we have also been invited by national organizations and other state agencies to speak about our improved planning and public engagement processes. We embrace the ideal of making state government better and delivering the best value for every tax dollar we spend. If you would like to learn more about our award-winning project prioritization process, please stop by our meeting on April 13.

Sincerely,



Pete K. Rahn
Director

cc: All MHTC Commissioners
Mari Ann Winters-cs
Roberta Broeker-ai